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THE COMMISSIONER OF PATENTS AND TRADEMARKS

Washington, D.C. 20231



Sir:

This a request for an application under 37 CFR 1.53(b) and (f)

Transmitted herewith for filing is the patent application of

Inventor(s) Andreas Baltes

For: DEVICE FOR DETECTING THE POSITION OF A SELECTOR LEVER

Enclosed are:

- ☒ 9 pages, abstract, specification, and claims; unsigned declaration (1 page)
- ☒ 3 soft 8.5"x11" size sheet of drawing (Figs. 1-3) attached to application
- ☒ Filing without fee or Declaration under 37 CFR 1.53(f)
- ☒ Express Mail mailing label no. on all filed papers
- ☐ certified copies of a German Patent Application
- ☒ Preliminary Amendment (PLEASE ENTER BEFORE CALCULATING CLAIM FEES)
- ☐ Information Disclosure Statement,

Claims as Filed

	NUMBER FILED	NUMBER EXTRA	RATE	BASIC FEE \$710.00
TOTAL CLAIMS	11 -20=	0	\$18	0
INDEPENDENT CLAIMS	1 -3=	0	\$80	0
Surcharge fee for filing under 1.53(f)				\$130.00
				\$840.00

- ☒ CLAIM IS HEREBY MADE OF THE BENEFIT OF THE FILING DATES OF THE German Patent Applications 199 54 173.6 filed November 10, 1999; and 199 60 446.0 filed December 15, 1999 UNDER 35 USC 119.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Express Mail mailing Label No. EJ450233940US  
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USA Patent Application  
Andreas Baltes  
DEVICE FOR DETECTING THE POSITION  
OF A SELECTOR LEVER  
Priority: German Patent Applications  
199 54 173.6 filed November 10, 1999; and  
199 60 446.0 filed December 15, 1999

Hon. Commissioner of Patents and Trademarks  
Washington, D.C. 20231

S I R :

PRELIMINARY AMENDMENT

Please amend this application simultaneously with filing as  
follows:

IN THE ABSTRACT

(UNNUMBERED PAGE 9)

Line 1, change "The ... to a" to --A--

Lines 5-6, after "lever." delete the paragraph spacing and  
continue with the words "In a ..."

Lines 13-14, delete "designed ... to be"

Last Line on page, delete "(Figure 1)"

IN THE SPECIFICATION

PAGE 1

Line 1, delete "Description"

Line 5, before this line, after the title, insert:

--FIELD AND BACKGROUND OF THE INVENTION--

Line 35, before this line insert:

--SUMMARY OF THE INVENTION--

Line 36, change "specify" to --provide--

Line 39, delete "the object is achieved"

PAGE 2

Line 1, delete "by virtue of the fact that"

Line 5, delete "designed in such a way as to be"

PAGE 3

Line 12, change "designed" to --provided--

Line 14, before this line insert:

--BRIEF DESCRIPTION OF THE DRAWINGS--

Line 16, change "drawing" to --drawings--

Line 17, delete the colon ":"

Line 25, before this line insert:

--DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT--

IN THE CLAIMS  
(APPLICATION PAGES 7-8)

Before claim 1, change "Patent Claims" to --I CLAIM:--

Please amend claims 1-9 as follows:

1. (amended) A device for detecting the position of a selector lever, in which the selector lever is connected to a device that emits a signal to an evaluation device in a desired position of the selector lever, wherein the selector lever (1) is connected to a diaphragm (2, 3) arranged in the beam path between an optical transmitter (18) and an optical receiver (9, 10, 11, 12, 13, 14), the diaphragm (2, 3), which follows [the] movement of the selector lever (1), being [designed in such a way as to be] optically transparent in the desired position of the selector lever (1), as a result of which the optical receiver (9, 10, 11, 12, 13, 14) receives the signal from the optical transmitter (18) and transmits it to the evaluation device (15).

2. (amended) The device as claimed in claim 1, wherein there is a said [an] optical receiver (9, 10, 11, 12, 13, 14) for each position of the selector lever (1) to be

determined, and an opening (5, 6, 7) in the diaphragm (2, 3) is moved over the optical receivers (9, 10, 11, 12, 13, 14) when the selector lever (1) is moved.

3. (amended) The device as claimed in claim 2, wherein the optical receivers (9, 10, 11, 12, 13, 14) are arranged in a fixed manner on a carrier element (8) in accordance with [the] sequence of motion of the selector lever (1).

4. (amended) The device as claimed in claim 3, wherein the evaluation device (15) connected to the optical receivers (9, 10, 11, 12, 13, 14) is arranged on [the] said carrier element (8).

5. (amended) The device as claimed in claim 3, wherein at least one said optical transmitter (18) is arranged on the carrier element (8), [the] an optical signal of which [can be deviated] is deviatable onto the diaphragm (2, 3) by [means of] a light guide.

6. (amended) The device as claimed in claim 1 [or 2], wherein there is one said diaphragm (2, 3) for each direction of motion of the selector lever (1).

7. (amended) The device as claimed in claim 6, wherein the diaphragms (2, 3) [can be moved] are movable in mechanical isolation from one another.

8. (amended) The device as claimed in claim 7, wherein the second of said diaphragms (3), [which] follows the selector lever (1) in an approximately vertical direction (y), and has two optically transparent openings (6, 7), [the] vertical movement of the selector lever (1) being converted into a circular-arc-like movement of the diaphragm (3).

9. (amended) The device as claimed in claim 5, [6 and 8,] wherein the light guide [is designed to] cover an extended area to ensure uniform distribution of the optical signal over the diaphragms (2, 3).

Please add the following claims:

--10. The device as claimed in claim 2, wherein there is one said diaphragm (2, 3) for each direction of motion of the selector lever (1).

11. The device as claimed in claim 5, wherein there is one said diaphragm (2, 3) for each direction of motion of the selector lever (1), the diaphragms (2, 3) are movable in mechanical isolation from one another, the second of

said diaphragms (3) follows the selector lever (1) in an approximately vertical direction (y) and has two optically transparent said openings (6, 7), vertical movement of the selector lever (1) being converted into a circular-arc like movement of the diaphragm (3), and the light guide covers an extended area to ensure uniform distribution of the optical signal over the diaphragms (2, 3).--


R E M A R K S

This amendment is being made simultaneously with filing this application. The abstract, specification and claims 1-9 have been amended in accordance with USA practice and new claims 10 and 11 are presented under 35 USC 112 to eliminate multiple-dependent form claims. No multiple-dependent claims exist as of the filing date.

No multiple-dependent form claims exist in this application.

Please enter this Preliminary Amendment prior to calculating the claim filing fee and prior to an action on the merits, which is respectfully requested.

Respectfully submitted,  
Andreas Baltes

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Description

Device for detecting the position of a selector lever

5       The invention relates to a device for detecting the position of a selector lever, in which the selector lever is connected to a device that emits a signal to an evaluation device in a desired position of the selector lever.

10       In many areas of application, there are selector levers that can be moved backward and forward in one direction, latch in or can be fixed in predetermined positions and control the operation of a connected unit as operating elements. It is desirable to detect the  
15       position of the selector lever in order to be able to control more effectively a system in which the unit controlled by the selector lever is incorporated. In a motor vehicle, information as to which transmission stage has been chosen is necessary for automatic speed  
20       control, for example.

      According to US 4,523,373, an actuating lever with a potentiometer is known, it being possible at all times to pick off from the potentiometer a voltage corresponding to the position of the selector lever.  
25       The potentiometer is installed in a housing in such a way that the same signal voltage is always emitted in a preselected position of the lever. Such contact-controlled position detection systems are subject to wear due to abrasion and dirt accumulation, resulting  
30       in variation of the signal voltage corresponding to a particular position of the selector lever over the service life of the potentiometer. There is no longer an unambiguous association between the voltage and the position of the selector lever.

35       The object on which the invention is based is to specify a device for detecting the position of a selector lever that operates reliably over its entire service life and can be produced at reasonable cost.

      According to the invention, the object is achieved



by virtue of the fact that the selector lever is connected to a diaphragm arranged in the beam path between an optical transmitter and an optical receiver, the diaphragm, which follows the movements of the selector lever, being designed in such a way as to be optically transparent in the desired position of the selector lever, as a result of which the optical receiver receives the signal from the optical transmitter and transmits it to the evaluation device.

10 The advantage of the invention resides in the fact that position detection is contactless. The switching device of the selector lever thus operates completely without wear. It is simple in construction and sufficiently robust for use in a motor vehicle.

15 Unambiguous detection of the position of the selector lever is ensured by the fact that there is an optical receiver for each position of the selector lever to be determined and that an opening in the diaphragm is moved over the optical receivers as the selector lever is moved.

20 For an embodiment that is particularly robust for use in motor vehicles, the optical receivers are arranged in a fixed manner on a carrier element in accordance with the sequence of motion of the selector lever.

25 A particularly compact and small switching device is achieved by arranging the evaluation device connected to the optical receivers on the same carrier element.

30 In a refinement, at least one optical transmitter is arranged on the carrier element, the optical signal of which can be deviated onto the diaphragm by means of a light guide. Such a device can be used in a flexible manner at any desired point of installation.

35 To enable the movement of the selector lever in different directions of motion to be detected unambiguously, one diaphragm is provided for each direction of motion of the selector lever. Here, the diaphragms can be moved in mechanical isolation from

one another. By virtue of this arrangement, all positions, both in the horizontal and/or vertical direction of motion of the selector lever, are reliably detected.

5       The second diaphragm, which follows the selector lever in an approximately vertical direction, advantageously has two optically transparent openings, the approximately vertical movement of the selector lever being converted into a circular-arc-like movement  
10 of the diaphragm.

To ensure uniform distribution of the optical signal over the diaphragms, the light guide is designed to cover an extended area.

The invention admits of numerous embodiments. One  
15 of these will be explained in greater detail with reference to the figures illustrated in the drawing, in which:

Fig. 1 shows a device according to the invention,

Fig. 2 shows the arrangement of the optical  
20 receivers on a circuit board and

Fig. 3 shows the arrangement of the optical elements of the device shown in Fig. 1.

Identical features are indicated by identical reference numerals.

25       Figure 1 shows schematically the solution according to the invention for detecting the position of a selector lever such as that which can be used in an automatic transmission for a motor vehicle. The selector lever can latch in various positions,  
30 thereby defining different transmission stages, namely park, reverse, neutral and 3 forward speeds.

In this arrangement, the selector lever 1 is connected to a first diaphragm 2 and a second diaphragm 3 by a mechanism (not shown specifically). The first  
35 diaphragm 2 follows the selector lever 1 when the latter is moved approximately in a linear direction (x-direction). If the selector lever 1 is moved perpendicular to the x-direction, diaphragm 2 is held in its position by blocking elements 4, and only

diaphragm 3 follows the movement of the selector lever 1.

Diaphragm 2 has an opening 5, while diaphragm 3 bears two openings 6 and 7 offset vertically relative to one another. Optical receivers, of which only one optical receiver 9 is shown, are arranged on a circuit board 8.

The arrangement of all the infrared receivers on the circuit board 8 is shown in Figure 2. Four infrared receivers 9, 10, 11, 12 serve as a detector for the movement of the selector lever 1 in the x-direction. They are positioned in such a way on the circuit board that, during the movement of diaphragm 2 by the selector lever 1, they are traversed completely one after the other by the opening 5 in this diaphragm 2.

Also arranged on the circuit board 8, vertically, are the infrared diodes 13, 14 that detect the movement of the selector lever 1 in the vertical direction (y-direction) and are associated with the openings 6 and 7 in diaphragm 3.

All the infrared diodes 9 to 14 are connected to an evaluation circuit 15, which is likewise arranged on the circuit board 8. The receiver diodes 9 to 14 convert the optical signal emitted by an optical transmitter 18 (Figure 3) into an electrical signal, which is evaluated by the evaluation unit 15. A transmission control device 16, which is connected electrically to the evaluation device 15, controls a transmission 17 as a function of the signal supplied by the evaluation device 15.

The optical elements of the switching device are shown again schematically in Fig. 3. A light source 18, likewise an infrared diode for example, which, for the sake of simplicity, is also arranged on the circuit board 8, illuminates the surface of the diaphragms 2 and 3. As already explained, the receivers 9, 10, 11, 12, 13, 14 are arranged on the circuit board 8, behind the diaphragms 2, 3, only receiver 9 being indicated in this illustration.

The device according to the invention operates as follows:

Since the selector lever 1 is connected mechanically to diaphragm 2, diaphragm 2 follows the movement of the selector lever 1 when the forward gears or neutral are selected. During this process, the opening 5 in diaphragm 2 is moved over the LEDs 9, 10, 11, 12. Here, the receiver diodes 9, 10, 11, 12 are positioned in such a way on the circuit board 8 that their positions each correspond to one latched position of the selector lever 1. If the opening 5 in diaphragm 2 exposes one of the receiver diodes 9, 10, 11, 12, an unambiguous signal combination is transmitted to the evaluation device 15. This allows the evaluation device 15 to ascertain the position of the selector lever 1. During the movement of diaphragm 2, diaphragm 3 remains in its preselected position, which is chosen so that the opening 5 in diaphragm 2 is not affected by diaphragm 3.

Only when the opening 5 in diaphragm 2 fully exposes the optical receiver for the predetermined position of the selector lever 1 is the position of the selector lever 1 assessed. Such an assessment can be performed in a simple manner in the electronic evaluation device 15 by ascertaining the light output supplied by the receiver. Reliable evaluation is ensured by threshold analysis of the signal supplied by the receiver.

If, for example, a reverse gear is to be selected, this being accomplished, as is known, by moving the selector lever 1 in the y-direction, stops 4 arranged under diaphragm 2 prevent movement of diaphragm 2 in this direction. In this case, only diaphragm 3 follows the movement of the selector lever 1. Here, diaphragm 3 has the openings 6 and 7 that must be brought into alignment with the receiver diode 13 or 14 on the circuit board 8. An appropriate mechanism is used to convert the vertical movement of the selector lever (1) into an approximately circular-arc-like movement of

diaphragm 3, this circular-arc-like movement of diaphragm 3 being opposite to the circular-arc-like movement of diaphragm 2.

5 The vertical movement of the selector lever 1 brings the opening 7 in diaphragm 3 into alignment with the receiver diode 14, and from this the evaluation device 15 detects the fact that a vertical movement of the selector lever 1 has taken place and that reverse gear is to be selected.

10 When the selector lever 1 reaches the desired Park position, the opening 6 in diaphragm 3 exposes receiver diode 13, thereby indicating to the evaluation device 15 that the desired position has been reached.

Patent claims

1. A device for detecting the position of a selector lever, in which the selector lever is connected to a device that emits a signal to an evaluation device in a desired position of the selector lever, wherein the selector lever (1) is connected to a diaphragm (2, 3) arranged in the beam path between an optical transmitter (18) and an optical receiver (9, 10, 11, 12, 13, 14), the diaphragm (2, 3), which follows the movement of the selector lever (1), being designed in such a way as to be optically transparent in the desired position of the selector lever (1), as a result of which the optical receiver (9, 10, 11, 12, 13, 14) receives the signal from the optical transmitter (18) and transmits it to the evaluation device (15).
2. The device as claimed in claim 1, wherein there is an optical receiver (9, 10, 11, 12, 13, 14) for each position of the selector lever (1) to be determined, and an opening (5, 6, 7) in the diaphragm (2, 3) is moved over the optical receivers (9, 10, 11, 12, 13, 14) when the selector lever (1) is moved.
3. The device as claimed in claim 2, wherein the optical receivers (9, 10, 11, 12, 13, 14) are arranged in a fixed manner on a carrier element (8) in accordance with the sequence of motion of the selector lever (1).
4. The device as claimed in claim 3, wherein the evaluation device (15) connected to the optical receivers (9, 10, 11, 12, 13, 14) is arranged on the carrier element (8).
5. The device as claimed in claim 3, wherein at least one optical transmitter (18) is arranged on the carrier element (8), the optical signal of which can be deviated onto the diaphragm (2, 3) by means of a light guide.
6. The device as claimed in claim 1 or 2, wherein there is one diaphragm (2, 3) for each direction of motion of the selector lever (1).

7. The device as claimed in claim 6, wherein the diaphragms (2, 3) can be moved in mechanical isolation from one another.

8. The device as claimed in claim 7, wherein the  
5 second diaphragm (3), which follows the selector lever (1) in an approximately vertical direction (y), has two optically transparent openings (6, 7), the vertical movement of the selector lever (1) being converted into a circular-arc-like movement of the diaphragm (3).

10 9. The device as claimed in claim 5, 6 and 8, wherein the light guide is designed to cover an extended area to ensure uniform distribution of the optical signal over the diaphragms (2, 3).

## Abstract

### Device for detecting the position of a selector lever

The invention relates to a device for detecting the position of a selector lever, in which the selector lever is connected to a switching device that transmits a signal to an evaluation device for a desired position of the selector lever.

In a device for detecting the position of a selector lever which operates reliably over its entire service life and can be produced at reasonable cost, the selector lever (1) is connected to a diaphragm (2, 3) arranged in the beam path between an optical transmitter (18) and an optical receiver (9, 10, 11, 12, 13, 14), the diaphragm (2, 3), which follows the movement of the selector lever (1), being designed in such a way as to be optically transparent in the desired position of the selector lever (1), as a result of which the optical receiver (9, 10, 11, 12, 13, 14) receives the signal from the optical transmitter (18) and transmits it to the evaluation device (15).

(Figure 1)



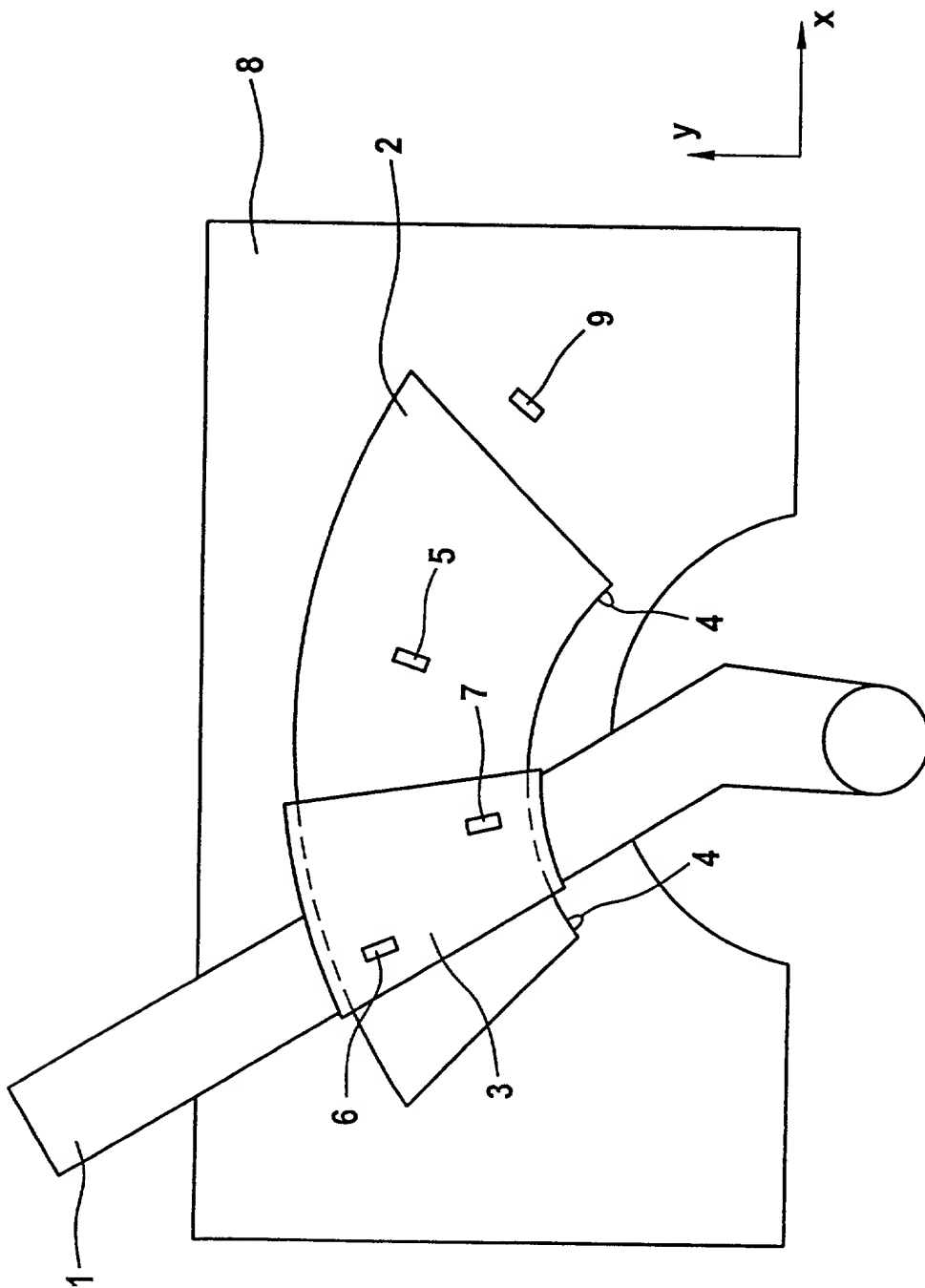


Fig. 1

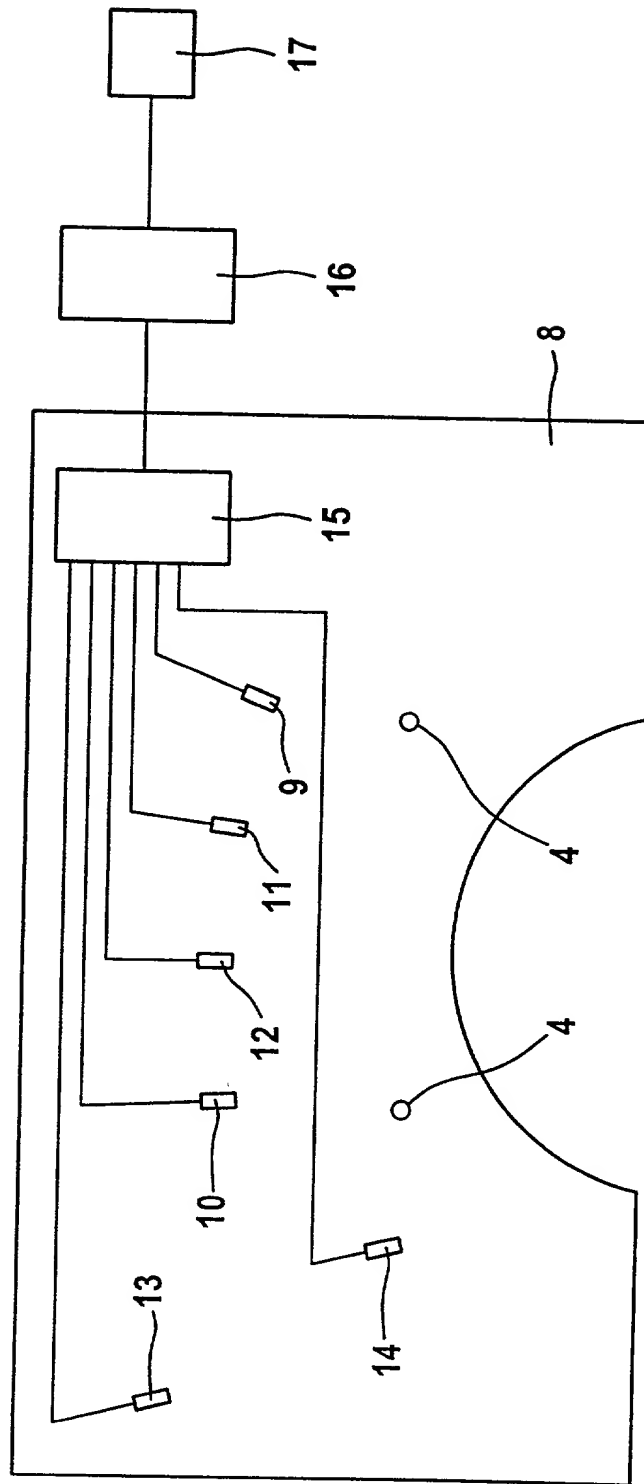


Fig. 2

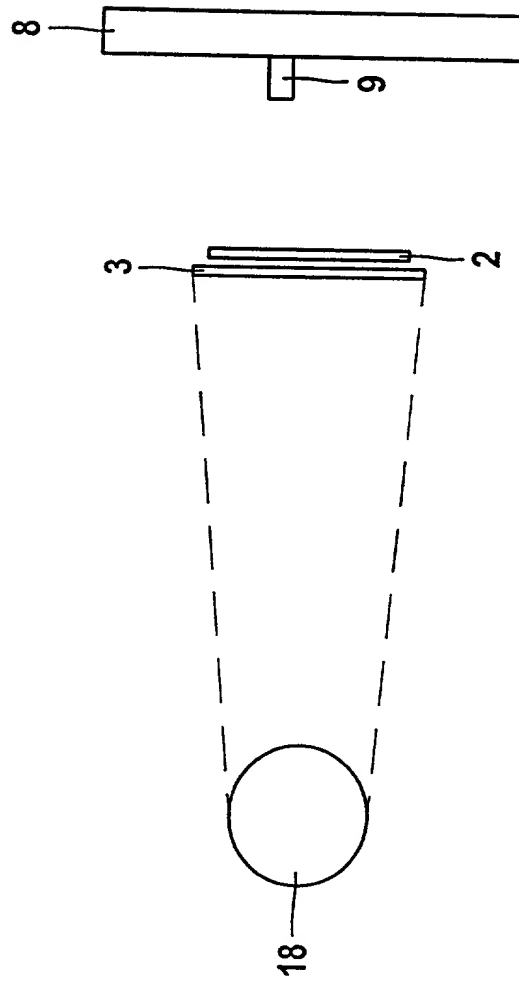


Fig. 3

## DECLARATION FOR PATENT APPLICATION

Docket Number (Optional)

4416 US

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled DEVICE FOR DETECTING THE POSITION OF A SELECTOR LEVER, the specification of which

is attached hereto unless the following box is checked:

☐ was filed on \_\_\_\_\_ as United States Application Number or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

## Prior Foreign Application(s)

			Priority Claimed
<u>199 54 173.6</u>	<u>Germany</u>	<u>10/11/1999</u>	
(Number)	(Country)	(Day/Month/Year Filed)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<u>199 60 446.0</u>	<u>Germany</u>	<u>15/12/1999</u>	
(Number)	(Country)	(Day/Month/Year Filed)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Number) \_\_\_\_\_ (Filing Date) \_\_\_\_\_ (Status — patented, pending, abandoned)

(Application Number) \_\_\_\_\_ (Filing Date) \_\_\_\_\_ (Status — patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor (given name, family name) Andreas Baltes  
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 Second inventor's signature \_\_\_\_\_ Date \_\_\_\_\_  
 Residence \_\_\_\_\_ Citizenship \_\_\_\_\_  
 Post Office Address \_\_\_\_\_

☐ Additional inventors are being named on a separate sheet attached hereto.